TEACHING NINTH GRADE HOME ECONOMICS THROUGH INQUIRY METHODS

by

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INTRODUCTION TO THE STUDY

Many educators and lay people feel that the teacher is to present subject matter and pupils are to learn it. Waetjen disagreed with this conventional role of the teacher. His objection centered around the difficulty of directly teaching another person since meanings are not totally communicated. In addition, it is just as hard to aid real learning by making the process seem easier. At best, teachers can only make learning possible by providing information, the material or resources from which to work, and the suitable setting or learning environment.[1]

To combat this conventional, dead-end-of-the-road type of education, concerned educators place emphasis on thinking as an outcome of learning.[2] Since both the problems of life and the kinds of knowledge will be constantly changing in the future, the development of the skills necessary for the dealing with these is a vital educational aim.[3] Stovall stated that

> the thinking home economics educator today must view these changes in terms of the life relatedness of home

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[1]Walter B. Waetjen, "Facts About Learning," Readings in Curriculum, pp. 241-249.

[2]Jerome S. Bruner, "Learning and Thinking," Readings in the Psychology of Cognition, pp. 76-86.

[3]Ralph W. Tyler, "Education in a World of Change," Journal of Home Economics, 54:531, September, 1962.

> economics instruction to pupils, not only in their lives today, but also in their roles as homemakers of tomorrow. To prepare pupils for this world of change, instruction will be of more value to pupils if it emphasizes the how in learning, thus producing independent learners.[1]

Tyler stressed that an understanding of basic concepts rather than memorization of details is essential for the kind of flexibility, adaptability, and continued learning required of people living in a world of change. Basic concepts can be used to think about and to deal with various problem situations.[2] Bruner pointed out that not only is knowledge changing, but it is also increasing in amount and becoming more structured. The only way in which people can keep pace is through having an understanding of basic principles and ideas and being able to determine the relatedness of knowledge. However, unless teachers give practice in class, many pupils will never learn this technique of thinking.[3]

Home economics teachers recognize the need for the development of a pupil's ability to think and solve problems. Williamson and Lyle stressed that the best way for a girl to learn to meet and solve problems of everyday living is to practice solving problems of a similar nature.[4]

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[1]Ruth Stovall, "Secondary Education," Journal of Home Economics, 54:537, September, 1962.

[2]Tyler, loc. cit.

[3]Jerome S. Bruner, Process of Education, pp. 5-12.

[4]Maude Williamson and Mary Stewart Lyle, Homemaking Education in the High School, pp. 43-72.

One may ask what causes thinking. According to Dewey, the origin of thinking is perplexity, confusion, or doubt.[1] Can thinking really be taught? Burton implied that no one can teach another how to think. Never-the-less, teachers can help pupils to improve their natural abilities and the thinking processes they use. Teachers can help pupils recognize and avoid certain errors and pitfalls that detour effective thinking.[2]

Educational literature proposes numerous methods for developing the thinking abilities of pupils. Inquiry has been recognized as one of these methods. Beginning with the presentstion of a puzzling situation to learners, the inquiry method provides a variety of ways to move through the processes of assimilation snd accommodation and concludes with pupils forming statements of generalizations or prinoiples most satisfactory for explaining the original situation.

The autonomous lesrning experience is the principal advantage of the inquiry method. As pupils become more involved with their learning, perceptions take on greater meaning. The role of the teacher assumes that of guidance rather than dictatorship of the learning situation. The primary concern throughout the process is individual growth and

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[1]John Dewey, How We Think, pp. 12-13.

[2]William H. Burton, Roland B. Kimball, and Richard L. Wing, Education for Effective Thinking, p. vi.

development as pupils increasingly become self-directive in their learning.

Using the inquiry method appears to offer home economics teachers an opportunity to plan learning experiences calling for a high degree of pupil involvement which should lead to greater conceptual growth. The decisions facing the teacher are: when is it desirable to use inquiry methods and how shall inquiry methods be adapted to the teaching of home economics?

Purpose of the Study

The purpose of this study was to develop curricular materials for using the inquiry method in teaching home economics. The development of materials was limited to planned lessons for the ninth grade in three selected areas of home economics. The teaching and evaluation of these lessons were not a part of the study.

Procedure

A review of literature on inquiry methods was made and implications were drawn for use in the teaching of home economics. Lessons designed to be taught by the inquiry method were developed in the selected areas of foods, child care and development, and family relationships.

Definitions of Terms Used

The terms defined for use in this study were:

Inquiry Method. The process whereby a generalization

stated or demonstrated in the form of a puzzling event, statement, or situation causes pupils to gather and test facts in order to explain the phenomenon.[1]

Discrepant Event. An event that a pupil does not understand; an event that causes a state of doubt, hesitation, perplexity, or mental difficulty.[2]

REVIEW OF LITERATURE

An examination of the concept of self-directed learning reveals teaching methods designed to stimulate pupil's inner curiosities and thereby arouse motivation to learn. Appearing and reappearing in recent educational literature are descriptive terms reflecting the aims of these methods such as inquiry, discovery, inquiry process, and inquiry training. The review of literature that follows presents a discussion of (1) discovery learning, (2) theory of inquiry, (3) use of inquiry in teaching, and (4) criticisms of inquiry methods.

Discovery Learning

Discovery and inquiry methods, though similar in their objectives for pupil behavior in learning, have confused readers through different interpretations. Inquiry suggests to the investigator a process by which learners discover

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[1]Bernice Goldmark, "Another Look at Inquiry," Social Education, 29:350, October, 1965.

[2]Ibid.

meanings. The discovery phase is where pupils, through perceptual experiences, derive real meaning from subject content. However, the activity by which pupils achieve "discoveries" is termed inquiry.

Bruner contended that one of the main advantages of the discovery method was increasing intellectual potency. His explanation emphasized the effect of discovery in leading the learner to organize encountered materials, to discover regularity and relatedness of knowledge, and to avoid following unproductive paths. Intellectual potency is enhanced as the learner practices a variety of techniques of problem solving, transfers information to related areas, and learns how to put to use the task of learning. Another advantage of the discovery method becomes evident as pupils are observed developing intrinsic motives for learning. Discovery frees the learner from environmental rewards and punishments.[1] Suchman believed that pupils approach learning as problems to solve, not just as assignments that are meaningless or ones that someone wanted them to do. Pupils also learn to be more skeptical toward statements indicating final or ultimate truths.[2] Ausubel stressed that where new ideas to

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[1]Jerome S. Bruner, "The Act of Discovery," Harvard Educational Review, 31:23-30, Winter, 1961.

[2]J. R. Suchman, "The Child and the Inquiry Process," Intellectual Development--Another Look, p. 76.

be learned are more difficult and unfamiliar, autonomous searching aids understanding primarily by bringing the pupil into a closer relationship with both the experiences and operations of abstracting and generalizing from data.[1] According to Keenan and Shannon, who proposed the use of the discovery method in teaching foods, the assumption is that pupils who start with the facts and work out their generalizations do a better job of learning than if the same generalizations and concepts are handed out to them already made. In addition to facts and generalizations, pupils are learning how to assemble facts, hypothesize generalizations, and to test them.[2]

Thelen felt the emergent aspect of discovery is learning. The programmed materials which Thelen helped develop at the University of Chicago were designed to stimulate pupils to a variety of discoveries. The materials were so designed that, although the discovery learning could be anticipated in part, there was enough vagueness that pupils had to identify underlying meanings, assumptions, and purposes in order to develop a specific concept or generalization. This undercurrent of thinking produced in pupils'

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[1]David P. Ausubel, "Some Psychological and Educational Limitations of Learning by Discovery," Arithmetic Teacher, 11:290-302, May, 1964.

[2]Dorothy Keenan and Barbara Shannon, "Experimentation in the Teaching of Foods," Illinois Teacher of Home Economics, 6:149, December, 1962.

minds a "sense of a problem" and a readiness to attempt new discovery activities.[1]

Inductive thinking is obtained through the use of these materials. The learner discovers elements of the discovery learning through feedback. One type of feedback is the perception of consequences of behavior: for example, class discussion following discoveries. The second type is immediate or specific feedback given during the individual discovery period as pupils use provided materials in the search for a pattern among elements. Learning will have greater impact upon the pupil after having been closely involved with his discovery through searching for a plan to organize elements into meaningful order and through meaningful feedback.

Theory of Inquiry

The inquiry method is a variation of teaching that has from time immemorial encouraged pupils to see new relationships, to seek meanings, and to solve original problems according to Robinson.[2] Although little has been done in the application and development of the inquiry method by educators, one in particular, J. R. Suchman, is considered the

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[1]Herbert Thelen, "The Concept, Character, and Use of Discovery Materials in Teaching," Professional Reprints in Education, No. 8822, pp. 3-4.

[2]Donald W. Robinson, "Teaching by the Inquiry Method," Bulletin of the National Association of Secondary School Principals, 50:119, September, 1966.

leading advocate of the inquiry method. The following material, except in a few cases, presents Suchman's concept.

Suchman renounces the traditional teacher-centered classroom in which the teacher shapes the experiences of learners to preconceived ideas held by society. Instead, the position and obligation of an educator is to establish the cognitive freedom of the individual by placing the individual in charge of his own intellectual destiny. In doing so, Suchman felt that this society would remain free.[1]

Inquiry is an attitude toward learning and a philosophy of education. The values upon which the method are based include an open mind and autonomous probing of the learner. To understand the foundation upon which the inquiry method is based leads to formulation of plans for use.[2]

Man's ability to understand and control his environment depends on how well it can be conceptualized. When a person tries to promote these conceptual changes for himself by gathering and processing information, the activity becomes inquiry. Being able to inquire is a necessary condition for the independence and autonomy of learning.[3] As the learner

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[1]J. R. Suchman, "Today's Problems--Tomorrow's Possibilities," The Instructor, 76:23,60, June-July, 1967.

[2]J. R. Suchman, "Learning Through Inquiry," Childhood Education, 41:290, February, 1965.

[3]J. R. Suchman, "The Child and the Inquiry Process," p. 59.

becomes more active and autonomous in the learning process and as more responsibility is placed upon the pupil's shoulders for decisions concerning the collection and interpretation of information, the more motivating and meaningful the learning.[1]

In the inquiry method two main processes are used to attain the method's goals: assimilation and accommodation. Assimilation involves the taking in and incorporating of what is perceived in terms of what is known.[2] Assimilation originates with a state of doubt, hesitation, perplexity or mental difficulty in order to launch the inquiry. The launching is usually represented by a discrepant fact or event that does not coincide with the pupil's knowledge and understanding of the world.[3] A discrepant event is described as producing a puzzling effect upon pupils because they have not fully analyzed the event and do not possess the necessary conceptual models to assimilate the event in the way they originally perceived it.[4]

Accommodation is the process of reshaping and reorganizing concepts until discrepant events are clarified. To utilize this process, pupils will test assimilated facts.

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[1]J. R. Suchman, "Learning Through Inquiry," p. 290.

[2]J. R. Suchman, "The Child and the Inquiry Process," p. 60.

[3]Goldmark, loc. cit.

[4]J. R. Suchman, "The Child and the Inquiry Process," p. 72.

Upon completion of assimilation and accommodation pupils will build theories, test theories, and incorporate them into broader personal experiences.[1]

A wide range of cognitive skills are involved in the inquiry process. These skills include the gathering, organizing and processing of data, the trying out of conceptual models and the restructuring of these models to test new data, and the testing of models for validity.[2] Practice in the use of logical inductive processes involved in discovering strengthens and extends these cognitive skills.[3]

Through the use of inquiry methods, the learner influences and programs his learning. The intrinsic satisfactions pupils derive from the inquiry search serves to motivate learning.[4] Suchman upheld that the experiences of data gathering, exploration, manipulation, and experimentation were intrinsically rewarding.[5] The activity of inquiry itself is more stimulating and rewarding than any grade or verbal approval that a teacher can offer according to

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[1] Ibid., p. 60.

[2] J. R. Suchman, "The Child and the Inquiry Process," pp. 68-69.

[3] J. R. Suchman, "Inquiry Training: Building Skills for Autonomous Discovery," Merrill Palmer Quarterly, 7:162-62, July, 1961.

[4] J. R. Suchman, "The Child and the Inquiry Process," p. 63.

[5] J. R. Suchman, "Inquiry Training: Building Skills for Autonomous Discovery," p. 151.

Keenan and Shannon.[1]

As knowledge is discovered, inquiry methods help build self-confidence in pupils. The fear of failure becomes less pronounced. In addition, the desire to make further inquiries is supported by the fact that inquiry learning enables pupils to become more familiar with the world in which they live.[2]

True inquiry investigations are wide open and the very essence of research. Inquiry leads to the discovery of knowledgeable whys and hows. Since true inquiry is self-activated and self-controlled, it is not suitable for the direct teaching of another.[3] Suchman proposed that at times, exacting procedures are necessary to carry out the process while at other times a wild intuitive leap is desirable. There is no fixed method of operation due to the self-directed nature of the learning situation.[4] However, for practical purposes in the classroom, inquiry learning is most productive when it has direction and purpose.[5]

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[1]Keenan and Shannon, op. cit., p. 148.

[2]J. R. Suchman, "Inquiry Training: Building Skills for Autonomous Discovery," p. 167.

[3]J. R. Suchman, "Inquiry in the Curriculum," The Instructor, 75:24, 64, January, 1966.

[4]J. R. Suchman, "The Child and the Inquiry Process," p. 69.

[5]J. R. Suchman, "Conditions for Inquiry," The Instructor, 75:137-8, November, 1965.

In structuring inquiry lessons Suchman suggested the following three conditions as criteria for a learning environment: "a problem that is real and meaningful to the children, freedom to . . . gather whatever data pupils want in whatever sequence desired, and a responsive environment."[1] The restrictions imposed by these conditions somewhat narrow the paths leading to discovered knowledge; when searching is too widely diffused, lesson meanings or concepts may not be revealed. The discrepant event narrows the searching by providing a focal point from which the process is aimed and is responsible for initial motivation to inquire.[2]

The teacher's role during the use of inquiry will be primarily that of director of the process. The teacher may need to provide the initial stimulus to implement inquiry or as an emergency measure, provide for dynamic situations in which pupil's thought processes are opened.[3] To keep the inquiry process going, the teacher can suggest that pupils use gathered facts to further the development of a problem.[4] The teacher will also be responsible for guiding pupils in developing skills for gathering data, for organizing and

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[1]J. R. Suchman, "The Child and the Inquiry Process," pp. 71-72.

[2]J. R. Suchman, "Conditions for Inquiry," loc. cit.

[3]J. R. Suchman, "The Child and the Inquiry Process," pp. 72-75.

[4]J. R. Suchman, "Role of the Teacher," The Instructor 75:26, December, 1965.

processing data, as well as for testing ideas and concepts.[1]

Creativity plays an important role in the inquiry process. The development of creativity requires that the teacher provide an atmosphere free from threat, from excessive competitive pressures, and from adult authority. Teachers will strive to promote the willingness of pupils to take risks and form guesses. A responsive environment frees pupils from inhibitions and external domination and results in more creative behavior.[2]

According to Keenan and Shannon, pupils may also need encouragement to accept this way of learning since most pupils have been trained to accept a teacher's word for everything. At first pupils may find it hard to change their behavior.[3]

And finally, the teacher helps pupils to understand the inquiry process itself through use. In order to help pupils understand and use this process well, the teacher must possess a thorough understanding of its operation. The teacher's educational background will require depth in addition to breadth if resources and additional information in many areas are to be provided to pupils.[4]

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[1]J. R. Suchman, "The Child and the Inquiry Process," pp. 72-75.

[2]J. R. Suchman, "Role of the Teacher," p. 26.

[3]Keenan and Shannon, op. cit., p. 149.

[4]Ibid.

Use of Inquiry in Teaching

The inquiry method was originally advocated for teaching mathematics and science. It has been adapted for use in the teaching of social science and reading.

Rutledge based the choice of inquiry for teaching science courses upon this method's effectiveness in helping the learner comprehend the true nature of the learning process. Rutledge believed that the teaching of the learning process in science courses was more important than the teaching of facts or even concepts.[1]

Suchman applied the inquiry method to the teaching of science by presenting a motion picture film to elementary pupils which demonstrated a puzzling physics event. After viewing the film pupils were instructed to gather information needed to explain the event by asking questions. To cause pupils to structure their own thinking, the teacher answered their questions only with yes or no statements. Pupils were guided into verbal expressions or hypotheses at different rates depending upon individual differences and the types of questions asked.[2]

In another elementary science class, the teacher had pupils observe the movement of a snake and attempt to form theories for the snake's movement. Again the teacher

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[1]James A. Rutledge, "Inquiry in the High School Science Laboratory," Science Education, 50:413, December, 1966.

[2]J. R. Suchman, "The Child and the Inquiry Process," pp. 71-72.

provided support through the manipulation of leading questions. Following the questioning, references were introduced so that pupils could search for facts to verify theories.[1]

In 1961, comparison was made of the learning of two groups of preschool children using plasticene balls to teach that an object when only changed in shape would retain the same weight. One group of children discovered this phenomenon while the other group learned it by a traditional method. A puzzling event was introduced when the teacher sneaked a small piece of plasticene from the ball to change the ball's weight. The ball was next changed in shape. Results indicated that the children who learned by the traditional methods were more apt to give up previously formed theories than those children who had formed theories through independent inquiry. Thus, as concepts become more a part of the learner and as the learner involves himself deeply in the situation, conclusions are reluctantly given up.[2]

Stauffer selected this method for teaching reading because he considered inquiry a necessary condition for independent research-type reading. He emphasized that when inquiry type reading is dominant, school libraries become the heart of the school's reading program and reading is not

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[1]J. R. Suchman, "Role of the Teacher," pp. 26,64.

[2]J. R. Suchman, "The Child and the Inquiry Process," pp. 67-68.

restricted to the individual classroom.[1]

Goldmark proposed the use of inquiry methods to teach the social sciences. Pupils would explore background information, consider all points of view, identify possible solutions, and analyze alternatives and consequences of each solution while inquiring into the nature of local and world problems.[2]

A different use of inquiry was found in schools developing independent study programs. Abington High School in Montgomery County, Pennsylvania, believed that an independent study program which employed many of the self-directed learning characteristics of the inquiry method could prove successful for 97 per cent of its pupils. Through experimentation with a variety of different independent study programs, Abington High School felt that the average, as well as the gifted pupil benefited.[3] In Kansas, a Salina high school recently experimented with an independent study program for the intellectually gifted pupil.[4]

Thelen, working at the University of Chicago, has proposed suggestions for the development of new programmed

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[1]Russel G. Stauffer, "Reading as Experience in Inquiry," Education Leadership, 24:407-409, February, 1967.

[2]Goldmark, op. cit., pp. 350-351.

[3]Allan A. Glatthorn and Joseph Perdenbar, "Independent Study for All Students," Phi Delta Kappan, 47:379-82, March, 1966.

[4]Harvey J. Littrell, "Presidents Newsletter," Kansas Association for Supervision and Curriculum Development, March 1, 1966.

materials to replace older ineffective materials that fail to comply with recent research on learning. Thelen suggested that these materials, when developed, may resemble guide sheets for inquiry activities. An awareness of a problem would be created by these guide sheets. Pupils will then program their learning by making appropriate choices or by taking specific actions to solve problems.[1]

Criticisms of Inquiry Methods

As with any new method or idea, there arise certain disadvantages and limitations which create doubts in the minds of the user. Suchman pointed out that one disadvantage of the inquiry process was in the inadequacy of standardized tests to accurately measure behavioral changes the inquiry process effects in pupils.[2] Suchman further questioned whether or not the same subject content could be as efficiently and as effectively covered. Additional class time was reported necessary to cover subject content due to the depth of knowledge pupils attempt to reach. In addition, it would be difficult for the teacher to refrain from engineering or structuring the inquiry to cover lessons and reach behavioral objectives.[3]

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[1]Thelen, op. cit., p. 4.

[2]J. R. Suchman, "The Child and the Inquiry Process," p.73.

[3]David P. Ausubel, "Some Psychological and Educational Limitations of Learning by Discovery," pp. 290-302.

Ausubel contended that results of inquiry methods had not undergone sufficient experimentation and evaluation to be determined reliable. He also questioned whether or not it would actually be possible to expect all pupils to think as abstractly as this method requires.[1] The average will be less able to independently discover than the bright pupil. Some pupils may not be able to discover enough to acquire common knowledge about a given subject. Then at times it is too easy for pupils, who are only human, to jump to conclusions without enough supportive data or evidence.[2] Ausubel suggested that teachers consider whether it is educationally sound to structure the total learning environment of the non-exceptional child to the abilities of gifted pupils.[3]

A final disadvantage becomes evident in the area of community and parental expectations. If this process were to be used effectively, pupils and parents will require re-education to accept the method and aims of a totally new type of classroom learning experience.[4]

Summary

An examination of recent educational literature

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[1] Ibid.

[2] David P. Ausubel, "Learning by Discovery," Education Digest, 28:22-24, February, 1963.

[3] David P. Ausubel, "Some Psychological and Educational Limitations of Learning by Discovery," pp. 290-302.

[4] J. R. Suchman, "Inquiry Training: Building Skills for Autonomous Discovery," pp. 147-169.

reveals limited, but important discussions of discovery and inquiry teaching methods. The purposes of discovery and inquiry are similar.

Discovery methods make use of pupils' intrinsic motivation to learn as freedom from traditional reward and punishment is increased. Pupils use inquiry in organizing and testing facts to discover concepts and generalizations. Generalizations are more meaningful when discovered independently. It is the emergent aspect of discovery experienced by pupils that constitutes learning.

Inquiry can be regarded as a learning process in which the learner influences and programs his learning. Inquiry methods promote conceptual growth as pupils use complimentary processes of assimilation and accommodation for investigating a discrepant fact, event, or situation. Conditions for use include a responsive classroom environment, guidance of pupils to develop skills necessary for inquiry, and preparation of teachers and pupils to accept new behaviors and roles. Restrictions imposed when using inquiry methods include careful selection of subject content and structuring of inquiry processes for pupils, and appropriate evaluation of pupil learning.

Limited use of the inquiry method has been made in teaching science, social science, and reading. Further study of the use of inquiry methods has been recommended so educators may base conclusions upon sufficient evidence of successful use in the classroom.

INQUIRY LESSONS FOR HOME ECONOMICS

Three subject areas of home economics were chosen for developing inquiry lessons: foods, child care and development, and family relationships.

Each inquiry lesson was designed to encourage home economics pupils to think of and search for many answers to situations and questions as real as possible. The lessons were developed for maximum pupil involvement and activity. Teacher guidance is shown at appropriate places where pertinent questions need to be asked or where a demonstration illustrates a realistic problem. For each lesson, objectives and generalizations were identified. Each lesson begins with a puzzling event to lead pupils to gather and test facts and ideas. The formation of conclusions are based upon learnings gained as pupils inquire for answers and for reasons.

Three inquiry lessons in each of the selected areas follow.

AREA: FOODS

OBJECTIVES: 1. Identifies physical characteristics of boiling and simmering liquids.

2. Predicts success of recipe if terms are not correctly used.

GENERALIZATIONS: Boiling of water occurs at 212 degrees Fahrenheit and is indicated by the presence of a rolling, bubbling characteristic of the water accompanied by steam; simmering results at 185 to 212 degrees Fahrenheit and is indicated by a quivering motion of the water.

Exposure to a larger surface area of heat decreases the amount of time necessary to reach boiling temperature.

The addition of sugar to water increases the amount of time required to achieve boiling temperature.

PUZZLING EVENT: Pupils are given a recipe in which the terms boiling and simmering are used. The teacher poses the question: "How can you tell when liquids are boiling or simmering?"

GATHERING FACTS | TESTING FACTS | FORMING CONCLUSIONS

Record answers to teacher's question concerning the difference between simmering and boiling.

Observe water as it reaches the boiling stage. Record observations, for example:

a) water quiet
b) current lines visible
c) tiny bubbles on bottom and sides
d) some bubbles break loose and rise to surface

GATHERING FACTS	TESTING FACTS	FORMING CONCLUSIONS
e) bubbles rise to surface very rapidly f) water rolls at surface in one or two spots g) water rolls over entire surface		
Teacher guided questions following observations: 1. What are the bubbles? 2. What was the temperature of the water when first placed in the pan? What was the temperature at the end of the observation? 3. Why do hot liquids steam? 4. At what stage was the water really boiling? 5. At what stage was the liquid simmering? At what temperature does simmering occur? 6. Does the difference in pan size affect length of time to reach the boiling point? 7. Does fruit juice boil at the same temperature as water? 8. Does a sugar solution boil at the same temperature as water? 9. Why do we boil some liquids and simmer others?[1]	Discuss possible answers to guide questions. Repeat experiment or parts in order to find answers to guide questions. Conduct additional experiments using fruit juices and sugared water. Read in physics text, general science text, foods text, or other resource material for specific answers.	Write class guesses to questions on chalkboard. Group each prepare a poster illustrating one answer to a guide question. Examine posters of other class members for comparison of answers.

[1]Adapted from Dorothy Keenan and Barbara Shannon, "Experimentation in the Teaching of Foods," Illinois Teacher of Home Economics, 6:152-154, December, 1962.

GATHERING FACTS	TESTING FACTS	FORMING CONCLUSIONS
		Predict success of a party punch recipe if boiling and simmering terms are not used correctly. Prepare party punch to apply knowledge of terms.

AREA: FOODS

OBJECTIVE: Discovers reasons for standard measurements and mixing techniques in producing a quick bread.

GENERALIZATION: The proportion of ingredients, the techniques used to combine ingredients, and the baking conditions determine the appearance and interior quality of the finished quick bread product.

PUZZLING EVENT: Pupils are instructed to prepare muffins using ingredients located at work centers. No previous instruction in muffin preparation has been given.

GATHERING FACTS | TESTING FACTS | FORMING CONCLUSIONS

Instructions to pupils:

Examine standard muffins:
Notice appearance, size, color, texture.
Pupils may taste.

Using list of ingredients for muffins on chalkboard, groups create recipe from listed ingredients.

GATHERING FACTS	TESTING FACTS	FORMING CONCLUSIONS
a) Determine amounts of each ingredient to use in recipe; record. b) Select and record a method and order of combining ingredients. c) Place in muffin tins and determine temperature and length of time for baking; record. d) Observe and taste baked product. Record observations and tasting. e) Compare appearance, texture, and taste with standard product prepared by teacher. Record differences and similarities.		
Observe teacher demonstration on the preparation of a standard muffin product.	Pupils ask questions about differences between their experimental methods and techniques. Prepare muffins by a standard recipe using standard methods; evaluate product. Compare evaluations of standard and experimental product.	Discuss ways experimental product and standard product are similar and different. Form conclusions on the effects of proportion of ingredients and techniques in preparation of a standard quick bread.

AREA: FOODS

OBJECTIVE: Discovers how to prepare products that are free from lumps in which starch acts as a thickening agent.

GENERALIZATIONS: When starch is used as a thickening agent, the use of appropriate methods for combining, for separating the starch granules, and for cooking will result in a product free from lumps.

PUZZLING EVENT: Teacher shows two cooked cornstarch puddings. The question is asked, "The same recipe was used to prepare both of these puddings. Why does one contain lumps?"

GATHERING FACTS | TESTING FACTS | FORMING CONCLUSIONS

Pupils search for answers by asking questions, for example:

Pupil - Was it due to the amount of milk used?

Teacher - No.

Pupil - Was it due to the amount of stirring during the cooking?

Teacher - Not entirely. Ask another question.

List possible reasons for lumping discovered from questioning on the chalkboard, for example:

not mixed well before cooking

temperature during cooking was too high

GATHERING FACTS	TESTING FACTS	FORMING CONCLUSIONS
Teacher guided question: "What ingredient is the lump in the pudding?" Examine recipe of pudding to hypothesize what the lump is composed of.	Strain pudding to obtain lumps for testing. Apply chemical tests for protein, fats, and carbohydrates, (sugar and starch). Record test results.	Discuss and compare conclusions of group tests.
Teacher guided question: "Why does starch present a lumping problem in cooking?" "When does the starch cause lumping?" Read in text and references for answers. Interview mothers or neighbor to find what ingredients and procedures they use to avoid lumping in food products. Discuss the role of starch as a thickening agent. Cite examples of uses of starch as a thickening agent in products.		Identify conditions causing lumping: a) mixing b) temperatures of cooking c) stirring while cooking

GATHERING FACTS	TESTING FACTS	FORMING CONCLUSIONS
	Experiment with conditions causing lumping of products using starch as the thickening agent by preparing gravy, cocoa, and sauce for cake. Use the following variables: a) Mixing conditions 1. fat with starch 2. liquid with starch 3. starch with sugar b) Temperature while cooking 1. low heat 2. medium heat 3. high heat 4. combinations of 1,2,and 3 c) Stirring while cooking 1. do not stir 2. intermittent stirring 3. constant stirring	
	Record all observations.	Form conclusions about techniques and methods that prevent formation of lumps in starch thickened products. Write a letter on how to avoid lumpy gravy to appear in Heloise's homemakers column in the newspaper.

AREA: CHILD CARE AND DEVELOPMENT

OBJECTIVES:
1. Discovers reasons for crying behavior in small children.
2. Uses knowledge gained to deal with a child's crying behavior while baby sitting.

GENERALIZATION: Children's behavior reflects underlying feelings resulting from previous learnings and experiences.

PUZZLING EVENT: Taped recording in which children are crying.

GATHERING FACTS	TESTING FACTS	FORMING CONCLUSIONS
Teacher asks: "Why do children cry?" Teacher guided question: "Is it the situation that makes the child cry?" Search for answers by asking questions. Questions will be answered with Yes or No statements, for example: Pupil - Is it the loud voice that is used? Teacher - No. Pupil - Is it the scolding that makes the child cry? Teacher - Not exactly, ask another question.		Write hypotheses as to why the children are crying in recordings, for example: a) received spanking b) hurt or fell c) tired or ill d) did not get own way

GATHERING FACTS	TESTING FACTS	FORMING CONCLUSIONS
Read about common behavior problems of children from references. Select from readings possible reasons for crying behavior in children. Discuss ways of preventing the situation and appropriate ways of dealing with the crying behavior.	Observe children at a) play with another child b) at home with parents c) in kindergarten d) playing alone at home Record any crying behavior observed and 1. describe behavior 2. identify possible causes for behavior 3. ways crying behavior was handled by adults present. Compare findings with class members. (Small discussions groups)	Compare reasons for crying from observations to crying hypotheses formed from tapes. Form conclusions as to situations that tend to produce crying behavior in small children.

GATHERING FACTS	TESTING FACTS	FORMING CONCLUSIONS
		Write a section for a babysitter's manual entitled, "How to Handle a Crying Child."

AREA: CHILD CARE AND DEVELOPMENT

OBJECTIVES:
1. Identifies, through use of senses, danger areas that threaten safety of children in the home.
2. Appreciates the contribution of a safe home to childrens' emotional and physical development.

GENERALIZATIONS: Sensory reactions are more immediately carried to the brain than are reactions recalled by previous training or learning.

Through sensory exploration, the individual learns about his world and later uses these learnings for protection in his environment.

PUZZLING EVENT: Opague projector used to show newspaper report of home accidents involving small children.

GATHERING FACTS | TESTING FACTS | FORMING CONCLUSIONS

Teacher guided question:
"What types of accidents can be identified from the news reports?"

List on chalkboard types of accidents from clippings; for example:
1. poisoning
2. fires
3. falls

Teacher guided question:
"What causes children to have so many home accidents?"

Read about accidents children become involved in from selected case studies and from reference materials.

GATHERING FACTS	TESTING FACTS	FORMING CONCLUSIONS
Discuss how a child learns from using hands, eyes, nose, and ears. Teacher guided question: "What senses of children may be identified as possible reasons for accidents?"	Interview mothers to find out why their children have accidents. Record mothers' opinions of reasons for child's accident, for example: a) liked to taste everything b) liked to listen to water run c) liked to reach out and grab things they saw	Form conclusions from discussion on what things children learned from use of eyes, hands, nose, and ears.
Brainstorm to answer question posed on poster, "How can the senses lead to the discovery of possible safety hazards in the home?" Poster shows a house in which pictures of an eye, an ear, a nose, and hands appear.	Experiment with own senses in detecting safety hazards in the classroom and in the home. Record sensory observations.	Discuss the possibilities for teaching a child to use senses to detect dangers: a) look and listen before crossing a street.

GATHERING FACTS	TESTING FACTS	FORMING CONCLUSIONS
		b) investigating smells of smoke. c) listen for unusual noises in the home and report to parents. d) know when an object is hot without getting burned finding out. After viewing the film, "The Todler's Hours of Hazard" without sound, write a narrstion based on clsss learnings.

AREA: CHILD CARE AND DEVELOPMENT

OBJECTIVES: Increases in understanding of self through study of children's emotions.

GENERALIZATIONS: Basic needs of every person include affection, recognition, and feeling of security.

Emotional development proceeds in an orderly manner and how individuals react to situations depends upon maturity and the nature of the situation.

PUZZLING EVENT: Pupils act out minute dramas involving teenagers and parents:

(1) being elected cheerleader.
(2) getting "chewed out" for upsetting a glass of milk.
(3) being accused of telling a lie.
(4) being told to finish dinner when not hungry.
(5) buying birthday present for "Mom" that she really liked.
(6) getting "nagged at" for walking through the house with mud on shoes.

GATHERING FACTS	TESTING FACTS	FORMING CONCLUSIONS
Teacher direction before minute dramas: "How would you feel and what would you do in each situation?" Using questions, record answers to each minute drama. Compare reactions of class members. List on chalkboard. Teacher guided question: "Do you suppose children would feel or act differently if they were in the same situation?"		In small groups, form hypotheses concerning the differences and similarities in child-teen emotional reactions to problem situations.

GATHERING FACTS	TESTING FACTS	FORMING CONCLUSIONS
	Interview a child, age six to ten to find out how they would feel in the same class problem situations. Record child's responses.	
	Read in references and text about emotional development of children. Identify how emotions are shown and/or controlled at each stage of development.	
	Relate to need for affection, recognition, and feeling of security.	
	Collect examples of children's reactions to various types of situations. Record situation and emotional reaction.	Analyze situations to determine reason for behavior. Decide how you would have felt if in the place of the child.
		Compare emotional reactions of children with emotional reactions of teens in similar situations to determine differences and similarities.

AREA: FAMILY RELATIONSHIPS

OBJECTIVES: Understands the different roles each family member plays within the family.

GENERALIZATION: An individual is better able to make a meaningful contribution to the family when she is aware of and understands her role in her family.[1]

PUZZLING EVENT: Overhead projector is used to show transparancies of cartoons illustrating the many roles a mother plays in the family, for example: (a) nurse, (b) cook, (c) chauffeur, (d) seamstress, (e) wife, (f) counselor, (g) companion. Each transperancy will be labeled, "This is a mother?"

GATHERING FACTS	TESTING FACTS	FORMING CONCLUSIONS
Teacher guided question: "What is a role?"		
Read in text and in sociology references.	Observe roles family members play at home and record observations of each individual's roles.	
	Compare home observations with at least one other classmate to determine similarities and differences of family roles.	Discuss observations in class: list roles of different family members, include siblings, parents, grandparents, other people living in the home.

[1] State of Nebraska, Working Materials in Teaching Family Relationships, December, 1966, p. 16, Mimeographed.

GATHERING FACTS	TESTING FACTS	FORMING CONCLUSIONS
Teacher guided question: "What roles do you play in your family?" Read in text for answers and in personal adjustment section of home economics department library for roles teenagers play in families. Ask parents for opinions.	Keep a daily log of activities done with and for family members for one week. List roles. At end of week, list all roles played during the week.	Compile list of role contributions made by teenage girls. Compare personal ideas of role contributions with parent's opinions of role contributions, for example: 1. dishwasher - frees mother from duties; parents agreed. 2. babysitter - parents are free to go more places; parents agreed but indicated that at times they worried when away from home. In small groups complete net worth statement: "My Value to My Family."

AREA: FAMILY RELATIONSHIPS

OBJECTIVES: Recognizes similarities and differences of families.

GENERALIZATION: American families, though similar in many ways, possess differences stemming from background, race, group customs, social mores, and from individual values.

PUZZLING EVENT: The teacher gives pupils a contest entry blank which has the following instructions: "In order to win a free, all expense paid trip to the Moon for you and your family, answer in thirty words or less: What is an American Family?"

GATHERING FACTS | TESTING FACTS | FORMING CONCLUSIONS

Keep entry blank.

View films showing life in families of other American cultures illustrating a variety of values in family living:

a) migrant family
b) Negro family in the south
c) Jewish family from a large Eastern city
d) Appalachian family

Read books or stories of different types of family life, for example:

The Story of the Trapp Family Singers
I Remember Mama
Cheaper by the Dozen

GATHERING FACTS	TESTING FACTS	FORMING CONCLUSIONS
Observe differences between the ways families engage in different activities at: a) grocery stores b) movies c) eating places d) sport events e) church Record observations. Teacher guided question: "Are there similarities in American families?" "Are there differences in American families?"	Search for answers to explain proposed reasons from a wide selection of resource material. a) Listen to tapes of talks by Americans of different backgrounds.[1] b) View films, (independently) from film library illustrating reasons for differences in people. c) Listen to talk presented by the school guidance counselor on "Every Family is Different, Though All Are Important."	Teacher guided question: "How has your thinking changed about the American family?" Write a paper describing "The American Family."

[1]State Historical Society of Wisconsin, "Sounds of Heritage Series," 1955 Tapes, State Historical Society of Wisconsin Tapes, 816 State St., Madison, Wisconsin 53706.

AREA: FAMILY RELATIONSHIPS

OBJECTIVE: Explores ways of improving parent-teenager relationships to promote better relationships at home.

GENERALIZATION: Communication between family members depends upon the acceptance of individual differences.[1]

PUZZLING EVENT: Show pictures illustrating scenes of parents and teens having arguments. Pictures will come from magazines, cartoons found in books or magazines, or from original sketch drawings.

GATHERING FACTS	TESTING FACTS	FORMING CONCLUSIONS
Teacher guided question: "Why are the parents and teenagers having an argument?" Record individual interpretations of reasons for each argument. List, for one week, all parent-teen conflicts at home. Teacher guided question: "What causes these areas of conflict between teenagers and their parents?"	Listen to panel on "Teen-Parent Conflict: an Age-Old Problem." (panel consisting of parents, grandparents, and teenagers.) Class discussion to reasons given by panel with "Clues" listed on chalkboard.	Identify "Clues", representing conflict areas from pictures and from personal experiences. Place compiled list on chalkboard, for example: a) age differences in parents and teenagers b) different values c) economics changes during growing up d) language differences and useage of slang.

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[1] State of Minnesota, "The Girl--Her Family, Friends and Community: Grade 9," July, 1965, p. 4, Mimeographed.

GATHERING FACTS	TESTING FACTS	FORMING CONCLUSIONS
	Search for facts to prove or disprove "Clues" in high school sciology texts and other library reference materials. Read teenager fiction written about teen-parent problems, for example: Junior Miss by Sally Benson Articles in "Seventeen" Magazine	
	Discuss findings in class.	Write findings on chalkboard opposite the appropriate "Clues".
Brainstorm on ways to improve relations between teenagers and their parents on what the teenager can do to improve relations with parents.	Try out two pupil selected ways at home. Report success and failure.	Relate individual success or failures to "Clues" on chalkboard. Determine reasons for success or failure. Prepare panel for F.H.A. meeting on "Ways the Teenager Can Improve Relations with Her Parents."

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Educators have long strived to motivate pupils to learn. Recent studies and theories in the areas of learning and thinking point to means of attaining a greater degree of motivation and involvement of pupils in learning.

Discovery and inquiry methods are proposed for autonomous learning, for inductive thinking, and for self-motivation. Autonomous probing on the part of the learner leads to the discovery of knowledgeable ways and whys. True inquiry is wide open, self-activated, and self-controlled. Inquiry can be regarded as a learning process in which the learner influences and programs his learning. A wide range of cognitive skills are involved in the inquiry process. These skills include the gathering, organizing and processing of data, the trying out of conceptual models and the re-structuring of these models to test new data, and the testing of models for validity.

Inquiry methods promote conceptual growth as pupils use complimentary processes of assimilation and accommodation for investigating a discrepant fact, event, or situation that does not coincide with his knowledge and understanding of the world. The discrepant event narrows the searching by providing a focal point from which the process is aimed and is responsible for initial motivation to inquire. From pupil inquiries, discoveries emerge that are meaningful to the

individual learner. Learning will have greater impact upon the pupil after having been closely involved with his discovery through searching for a plan to organize elements into a meaningful order.

Conditions for use of inquiry methods include a responsive classroom environment, guidance of pupils to accept new behaviors and roles. Restrictions imposed when using inquiry methods include careful selection of subject content and structuring of inquiry processes for pupil, and appropriate evaluation of pupil learning.

Studies on the application of inquiry methods in subject areas, though limited, indicate definite advantages of inquiry for contributing to pupil motivation to learn and to pupil achievement of depth in understanding the subject content. However, critics of inquiry methods contend that to structure the curriculum in favor of the intellectually bright pupil and to base the choice of this method for teaching all subject content on a few selected studies would be educationally unsound.

The purpose of this study was to develop curricular materials for using the inquiry method in teaching home economics. The development of materials was limited to planned lessons for the ninth grade in three selected areas of home economics. The teaching and evaluation of these lessons were not a part of the study.

Conclusions

Conclusions were drawn at two stages of this study.

Those drawn after reviewing the literature were:

The inquiry method, if used appropriately, could help pupils reach a higher level of cognitive behavior than presently achieved in many home economics classes. It could enable the brighter pupil to use mental abilities more fully through independent study.

Competitive pressures might be reduced for the slow learning pupil since inquiry learnings are individual.

The home economics teacher will need to be careful in the selection of content areas in which to use inquiry methods. Inquiry should not be used as a game to "liven" up class experiences, but used as a means by which pupils learn.

An entire unit would not have to be taught by the inquiry method. Inquiry processes could be used when clear understandings of content areas are difficult to grasp; for example, in developing scientific cause and effect in foods and textiles.

Inquiry lessons will need to be planned in sufficient detail to provide needed opportunities for freedom in learning.

The home economics teacher's role will be viewed differently. Value judging of pupil's ideas and work will be more limited as pupils inquire for knowledge. The teacher will need to provide guidance for finding information instead of serving as a major source of information.

The department's supply of existing reference materials and equipment will need to be evaluated for use in teaching by inquiry. In addition, new resources or possible new uses of existing resources may need to be found by the teacher.

As programmed materials become available for home economics classes and as teachers use and become more familiar with these instructional materials, they may be able to construct simple class materials to help guide pupil inquiries.

Evaluative measurements will probably take on new appearances and will not all be of the pencil and paper type. When developing pencil and paper tests, construction will need to be aimed at pupil ability to apply lesson concepts and generalizations. Testing for facts would be minimized.

In order to adequately evaluate learners when using the inquiry method, the teacher will need to know the pupil's initial knowledge and understanding of the subject in order to measure growth. Home economics teachers may also need to examine preconceived standards used for evaluating pupil progress.

At the end of the study, the following conclusion was drawn:

Inquiry lessons could be developed for teaching home economics. Lessons were planned in the areas of foods, child care and development, and family relationships.

Recommendations

Recommendations based upon limitations of this study are:

1. Students be involved in planning objectives for these inquiry lessons.

2. The lessons be taught and evaluated to determine the values of using inquiry methods in the home economics curriculum.

3. Study be made of the effectiveness of using inquiry methods in teaching home economics pupils of varying degrees of ability.

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TEACHING NINTH GRADE HOME ECONOMICS THROUGH INQUIRY METHODS

by

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ABSTRACT

Many educators and lay people feel that the teacher is to present subject matter and the pupils are to learn it. Educators disagreeing with this conventional view, point toward recent studies and theories that emphasize thinking as an outcome of learning and propose methods for motivating pupils to learn and develop thinking abilities.

Home economics teachers have recognized the need for development of a pupil's ability to think and solve problems. Inquiry methods appear to offer home economics teachers an opportunity to plan learning experiences calling for a high degree of pupil involvement which should lead to greater conceptual growth.

The purpose of this study was to develop curricular materials for using the inquiry method in teaching home economics. The development of materials was limited to planned lessons for the ninth grade in three selected areas of home economics. The teaching and evaluation of these lessons were not a part of the study.

The reviewed literature revealed limited, but important discussions on discovery learning, the theory of inquiry, and the use of inquiry in teaching.

Inquiry is an attitude toward learning and a philosophy of education which leads pupils to discover knowledgeable ways and whys. The activity by which pupils achieve

discoveries is termed inquiry. An open mind and autonomous probing of the learner are values upon which inquiry methods are based. Through the use of inquiry methods the learner influences and programs his learning. Intrinsic satisfactions pupils derive from the inquiry search serve to motivate learning. The inquiry method begins with introducing a discrepant event to pupils to create a state of doubt, hesitation, perplexity, or mental difficulty. The discrepant event provides initial motivation for inquiry as well as providing a focal point for data gathering, exploration, manipulation, and experimentation. During the investigation of the discrepancy, conceptual growth is enhanced as discoveries emerge meaningful to the individual learner.

Inquiry has been applied in teaching science, reading, and the social sciences. Variations of inquiry methods have also been used in independent study programs and in developing programmed materials. As with any new method or idea, critics have pointed out disadvantages and limitations of inquiry methods in respect to the amount of class time needed to use with pupils of varying intellectual abilities, and to means of evaluation.

Three subject areas of home economics were chosen for developing inquiry lessons: foods, child care and development, and family relationships. Each inquiry lesson was designed to encourage home economics pupils to think of and search for

many answers to situations and questions as real as possible. The lessons were developed for maximum pupil involvement and activity.

Recommendations were made for the involvement of pupils in planning objectives for inquiry lessons, for evaluating the effectiveness of inquiry to reach home economics pupils of different abilities, and for determining the value of inquiry in the home economics curriculum.